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INVENTION: New Multi-Resolution Waveforms

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WHAT IS CLAIMED IS:

1. A means for the design of new multi-resolution waveforms and filters in the Fourier domain with properties which

provide extensions of the Wavelet concept to the Fourier domain or equivalently the frequency domain

provide single waveform designs for all of the waveforms at multiple scales

provide designs which requires a relatively few design coordinates compared to the FIR time response samples for the waveform
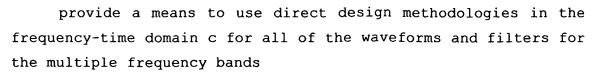
provide design methodologies which can incorporate application metrics to improve the waveform performance

provide designs that allow the use of direct design methodologies that circumvent the need to solve a Wavelet iterated filter bank construction to obtain the waveforms thereby providing improved flexibility to meet the application goals

2. A means for the design of multi-resolution waveforms and filters in the frequency domain or equivalently the Fourier of the t-f space for waveform and filter applications, with properties which

provide a means for single design to be used for all of the waveforms at the multiple resolutions or frequency bands

provide a means for designs that require a relatively few design coordinates compared to the number of digital samples covered by the Wavelet

provide a means for the designs to include frequency and time application metrics to improve the waveform performance

provide a means to use direct design methodologies in the frequency-time domain c for all of the waveforms and filters for the multiple frequency bands

3. A method for the design of multi-resolution waveforms which allows Fourier domain techniques to be used. Properties can include some or more of the listed properties in (1) and (2).

4. A method for the design of multi-resolution waveforms which can incorporate Fourier domain techniques into design methodologies which can include analytical and iterated filter bank construction design techniques.

5. A method for the analysis and design of multi-resolution waveforms using Fourier domain techniques which take advantage of the new invention disclosures on the characterization and design of multi-resolution waveforms in the Fourier domain.

6. A new formulation in (5) for multi-resolution waveform as a function of the dc multi-resolution waveform which adds the concept of a frequency index that allows the multi-resolution waveform to be placed arbitrarily throughout the t-f space thereby 1) avoiding the restrictions of the Wavelet iterated filter construction for tiling a t-f space, and 2) allowing the new multi-resoloution waveforms to be used for multi-resolution communications and for bandwidth-on-demand communications application, in place of traditional Wavelets.